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Potato moth *Phtholimide operculella* (Zeller, 1873) (Lepidoptera: Gelechiidae) of *Solanum tuberosum* L. (Solanaceae).

Carlos Henrique Marchiori¹

¹ Instituto Federal Goiano

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Co-authors: Marco Vinícios de Oliveira Santana² and Klebert de Paula Malheiros³.

²⁻³Instituto Marco Santana, Goiânia, Goiás, Brazil.

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The potato moth is one of the main health challenges facing the crop in all producing countries. Especially in tropical and subtropical climates with higher temperatures, as the insect is favored by the hot and dry periods that occur during the potato development cycle. The potato tuber moth or potato moth *Phtholimide operculella* (Zeller, 1873) (Lepidoptera: Gelechiidae) is a cross-infested pest, as it is found both in the field and in warehouses, damaging foliage, and tubers. Adults are small moths measuring 10mm to 12mm in length and gray/yellowish in color with small, irregular black spots. The moths fly at night, carrying out oviposition on plant debris, in the soil, on leaves, in exposed tubers and even near the tuber buds. To do this, they can enter cavities in the ground to perform the posture. Each female can lay around 300 eggs with an incubation period of five to ten days (Figure 1) [1-10].

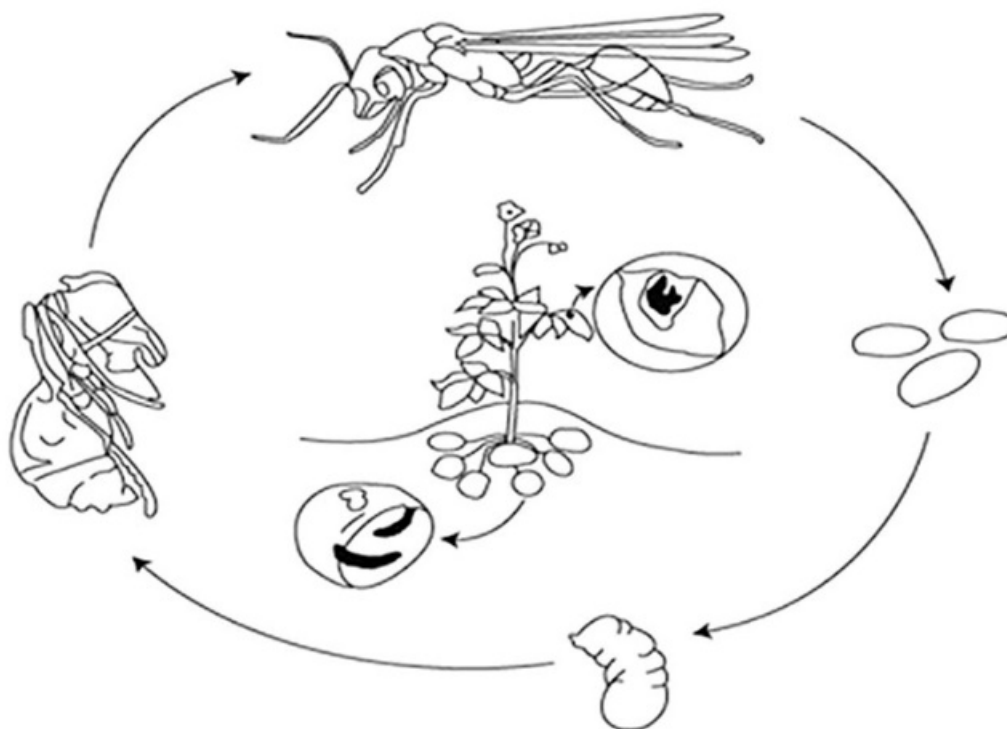


Figure 1. Life cycle of *Phthorimide operculella* (Zeller, 1873) (Lepidoptera: Gelechiidae). Source: <https://www.ucanorte.pt/destaques/artigos-tecnicos/a-traca-da-batateira/>.

It is in the larval stage that damage occurs, as the caterpillars settle on the leaves, stems, and tubers for a period of ten days to 20 days. During this period, the youngest caterpillars feed on the leaves, perforating the parenchyma, internally undermining the stems, causing loss of leaf tissue and death of the plant's growing points. The pupae measure around 8mm, have a caramel color and a smooth structure. This stage can vary from five days to ten days, depending on temperature conditions. In this pupal stage, where metamorphosis occurs, the caterpillar transforms into an adult. The time required for the insect to complete a life cycle is 20 days to 40 days (Figure 2).



Figure 2. The developmental stages of the potato tuber moth, *Phthorimide operculella* (Zeller, 1873) (Lepidoptera:

Gelechiidae): (A) egg, (B) larva, (C) pupa, and (D) adults—female (left) and male (right). Source: Photos: Courtesy of CIP.

Among the measures recommended to reduce the potato moth population in the field and, in this way, minimize damage both in the field and in the store, the following stand out:

1) Good soil preparation; 2) Planting time; 3) Planting depth; 4) Stacks; 5) Irrigation frequency; 6) Pheromone traps; 7) Harvest period; 8) Storage of healthy tubers; 9) Start-up and harvest period; 10) Destruction of cultural waste; 11) Chemical control.

Losses in warehouses can reach 30 to 40% of stored tubers. Among the control measures recommended for controlling potato moth in warehouses, the following stand out:

1) Warehouse cleaning; 2) Store healthy tubers; 3) Repellent plants; 4) Pheromone trap; 5) Use of diffuser lights.

Spray the entire interior with pyrethroid insecticide applied with a motorized backpack atomizer, preferably equipped with a centrifugal pump, so that the spray reaches any height. You can also mist the warehouse with insecticide containing smoke, using devices called thermofoggers. Space spraying or fogging aims to kill adult moths to prevent them from laying eggs on potatoes to be stored [1-10].

Younger caterpillars attack the leaves, creating mines until they begin to dry out. Later they abandon the leaves, starting to attack the fruits, where they make galleries, destroying them. Control: Spraying with specific insecticides, registered for crops (Figure 3) [11]

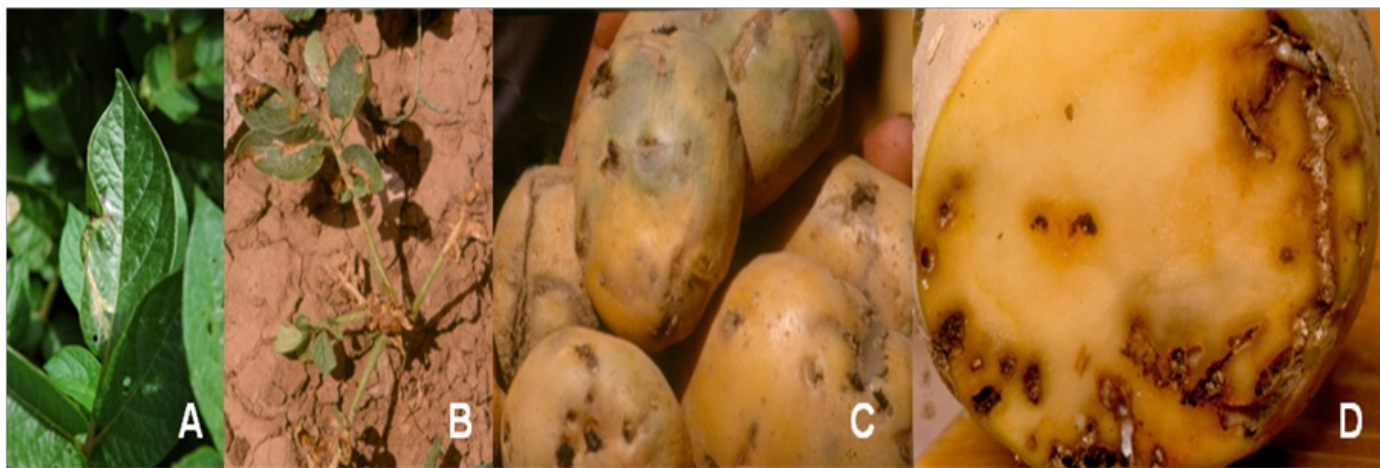


Figure 3. Photos 1 Symptoms of potato tuber moth, *Phthorimide operculella* (Zeller, 1873) (Lepidoptera: Gelechiidae): (A, B) larvae infestation on leaves and (C, D) on tubers. Source: Photos: Courtesy of CIP.

References

[1] Andrei E. Ecompendium of agricultural pesticides: Practical guide to phytosanitary products for agricultural use. 10th ed. São Paulo: Editora Andrei. 2017.

- [2] Souza JC, Silva RA, Rebelles PR, Abreu FA. Entomology – Potato Moth: Bioecology, damage and control [Internet]. Itapetininga: Brazilian Potato Association; @2024 [cited 2024 Mar 17]. Available from <https://www.abbabatatabrasileira.com.br/materias-das-revistas/entomologia-traca-da-batata-bioecologia-dano-e-controle/>.
- [3] Andrei E, Souza JC, Reis PR. Potato pests in Minas. 1st ed. Belo Horizonte: EPAMIG, 1999.
- [4] Golizadeh A, Zalucki MP. Estimating temperature-dependent developmental rates of potato tuberworm, *Phthorimaea operculella* (Lepidoptera: Gelechiidae). Insect Science. 2012; 19(5): 609–620.
- [5] Gostick KG, Heuser SG, Goodship G, Powell DF. Bromide residues in potatoes fumigated with methyl bromide. Potato Research. 1971; 14: 312–315.
- [6] Hassani-Kakhki M, Karimi J, Hosseini M. Efficacy of entomopathogenic nematodes against potato tuber moth, *Phthorimaea operculella* (Lepidoptera: Gelechiidae) under laboratory conditions. Biocontrol Science and Technology. 2013; 23(2): 146–159.
- [7] Kfir R. Biological control of the potato tuber moth (*Phthorimaea operculella*) in Africa. In: Neuenschwander P, Borgemeister C, Langewald J, eds. Biological Control in IPM Systems in Africa. 1st ed London: CABI; 2003. p. 77–85.
- [8] Kroschel J. Integrated Pest Management in potato production in the Republic of Yemen with special reference to the integrated biological control of the potato tuber moth (*Phthorimaea operculella* Zeller). Tropical Agriculture 8. 1st ed. Weikersheim: Margraf Verlag. 1995.
- [9] Kroschel J, Koch W. Studies on the use of chemicals, botanicals, and biological control in the management of the potato tuber moth in potato stores. Crop Protection. 1996; 15(2): 197–203.
- [10] Kroschel J, Lacey L. Integrated pest management for the potato tuber moth – a potato pest of global proportion. Tropical Agriculture 20, Advances in Crop Research 10. 1st ed. Weikersheim: Germany: Margraf Verlag. 2008.
- [11] Potato pests. Tagged adult, Africa, development, egg, infestation, larva, larvae, pest, *Phthorimaea operculella*, potato pest, potato tuber moth, pupa, risk atlas for Africa, tuber, Zeller 1873.